Commonwealth of Australia

EDICT OF GOVERNMENT

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AS 4092 (1993) (English): Exercise Cycles - Safety Requirements [Authority: Mandatory Standard -- Regulations Under the Trade Practices Act of 1974]

"We will sell to no man, and we will not deny or defer to any man, either justice or right."
Parliamentary Counsel
Australian Capital Territory

"The content of the law should be accessible to the public."
Honourable Murray Gleeson, AC, QC
11th Chief Justice of the High Court

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AS 4092—1993

Australian Standard®

Exercise cycles—Safety requirements

This Australian Standard was prepared by Committee CS/87, Safety of Exercise Cycles. It was approved on behalf of the Council of Standards Australia on 26 August 1993 and published on 11 October 1993.

The following interests are represented on Committee CS/87:

Child Accident Prevention Foundation of Australia
Department of Public and Consumer Affairs, S.A.
Federal Bureau of Consumer Affairs
Metal Trades Industry Association
Ministry of Consumer Affairs, Vic.
Retailers Council of Australia
South Australian Health Commission
Western Sydney Area Health Unit, Health Department, N.S.W.

This Standard was issued in draft form for comment as DR 92180.

AS 4092—1993

Australian Standard®

Exercise cycles—Safety requirements

First published as AS 4092—1993.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140
ISBN 0 7262 8551 X

PREFACE

This Standard was prepared by the Standards Australia Committee on Safety of Exercise Cycles at the request of the Commonwealth/State Consumer Products Advisory Committee. The Standard arises from the reported incidence of domestic accidents involving the fingers and toes of young children caught in the rotating and other moving parts of exercise cycles when the cycles are being ridden by older persons and when put to unintended use by young children in the absence of an older person.

The requirements of this Standard are consistent wherever practicable with the corresponding requirements of—

ASTM F1250: *Standard Consumer Safety Specification for Exercise Bicycles*; and

DIN 32 932: *Home sports equipment, Pedal crank training equipment, Cycle trainers.*

However, the diameter of the probe simulating a child's finger, which is to be used to test guards on the sprocket and chain drive mechanism, has been set at 5.6 mm. Anthropometric data on the finger sizes of young children indicate that this size, which is also consistent with that recommended by the US Consumer Product Safety Commission, will provide a substantially greater level of safety protection than the 9.3 mm diameter probe specified in the ASTM and DIN Standards referred to above. Australian and international injury data indicate that the most serious safety hazard in respect of both incidence and severity is in the chain and sprocket drive mechanisms of exercise cycles, thereby justifying in the Committee's view, the departure from the ASTM and DIN Standards.

As regards protection of the flywheel and loading mechanism, the Committee was advised that it would be difficult to insist on use of a small diameter test probe to test the cages guarding these mechanisms, as the cycles are almost entirely imported and the cost of modifying the flywheel guards to Australian requirements would be prohibitive. Since injury data appears to show a noticeably less serious safety problem in this area, it was decided to retain the ASTM/DIN 9.3 mm diameter probe for this purpose. Child accident prevention interests on the Committee indicated that research in this area will continue, giving particular emphasis to any adverse effect of adoption of the larger probe size for testing the flywheel and loading mechanism guards.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

CONTENTS

FOREWORD

Statistics show that there is a significant incidence of injury to the fingers and hands of young children from unguarded exercise cycles in domestic use. These injuries have been shown to occur not only when the cycle is being ridden by another person, but also when put to some unintended use by a young child in the absence of supervision by an older person. Injuries in the main are associated with chains and sprockets, flywheel spokes and loading mechanisms, and the loading mechanisms associated with solid flywheels.

Whilst the primary emphasis in this Standard is on safety for young children, some aspects of user or rider safety have been included, notably the integrity of the seat and seat support. Although supported by some injury statistics, this inclusion is influenced by the extreme severity of likely injury rather than frequency.

No requirements have been included for locking the mechanism of an exercise cycle when not in use. It is believed that proper guarding at hazardous locations on the cycle is a more appropriate objective. However, manufacturers are encouraged to provide means for locking the mechanism as an added safeguard. A passive locking system, i.e. one which activates automatically when the cycle is not being ridden, is to be preferred.

STANDARDS AUSTRALIA

Australian Standard

Exercise cycles—Safety requirements

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard specifies guarding and other safety requirements for all types of exercise cycles which are intended for domestic use. It does not apply to any system or assembly, part of which is a bicycle as defined in AS 1927, e.g. a trainer or simulator, nor does it apply to devices designed, labelled or marketed for use in other than domestic situations.

1.2 REFERENCED DOCUMENTS The following document is referred to in this Standard:

AS 1927 Pedal bicycles for normal road use—Safety requirements

1.3 DEFINITIONS For the purposes of this Standard the definitions below apply.

1.3.1 Exercise cycle—a stationary device designed to be used for personal physical exercise by means of an activity simulating bicycle riding.

1.3.2 Flywheel—the wheel to which the energy of the cycling activity is finally directed, and to which a loading device for absorbing that energy can be applied.

SECTION 2 GUARDING OF MOVING PARTS

2.1 GENERAL The guarding arrangements on exercise cycles shall be designed primarily to protect young children from injury when in the vicinity of a cycle which is either in use by another person, or stored in a location accessible to young children.

2.2 FLYWHEEL, DRIVE TRAIN AND LOADING MECHANISM Guards shall be provided to protect dangerous parts at all locations which constitute shear, crushing, or drawing-in hazards, giving particular attention to the following:

(a) The flywheel.

(b) The drive train.

(c) The flywheel loading mechanism.

Examples of these points of potential hazard are illustrated in Appendix A.

When tested in accordance with Appendix B, the exercise cycle shall be shown to have no locations where the specified test probes are able to penetrate a guard or otherwise be placed in a position where they are subject to any of the hazards specified above. Furthermore, there shall be no location where application of the specified axial force through the test probes causes any part of a guard to suffer permanent deformation (other than a minor dent no larger than the tip of the probe), or fracture of the guard or its supports.

Smooth-surfaced solid flywheels presenting no more than a rubbing hazard are permitted in an unguarded condition provided all entrapment points near their centres and peripheries are properly guarded in accordance with this Standard.

NOTE: Pedal crank clearances to the cycle frame and the clearances between slowly moving parts of dual action cycles are not specified. The known incidence of serious injury caused by these components is relatively small. Manufacturers should, however, provide clearances of between 12 mm and 20 mm wherever practicable. This clearance range will generally be large enough to prevent crushing of toes and fingers, but too small to admit whole limbs.

2.3 FIXING OF GUARDS Guards shall be securely and permanently fixed to the cycle frame in such a way that they cannot be removed without use of a tool. The use of spring-loaded devices is not considered adequate.

SECTION 3 OTHER SAFETY REQUIREMENTS

3.1 ADJUSTABLE COMPONENTS Wherever adjustment capable of being exceeded is provided between mating components (e.g. at seat pillars or handlebar stems), marks shall be provided on the mating parts to indicate the limit of safe adjustment. Such marks shall not affect the structural integrity of the mating part concerned.

3.2 SEATS Seats and seat supports shall be constructed so as to avoid danger of the seat or its support failing and causing injury to the rider during use of the cycle. When tested in accordance with Appendix C, the seat, seat support and adjustment mechanism shall show no signs of fracture or slippage, no dynamic or permanent deformation greater than 12.5 mm under the 100 kg and 200 kg test loadings respectively, and no signs of any other form of failure capable of inflicting impalement or other injury on a rider.

The seat and seat support shall incorporate a substantial positive means of preventing the support from penetrating the seat.

NOTE: Typical means of preventing penetration of the seat include mechanical obstructions such as shoulders, end stops and steel plates.

3.3 SHARP EDGES AND POINTS All edges of parts directly accessible to the user or to bystanders shall be burr-free, rounded or otherwise guarded.

SECTION 4 MARKING AND USER INSTRUCTIONS

4.1 MARKING Exercise cycles shall be permanently and legibly marked or labelled with the name of the manufacturer, if made in Australia, or the distributor or importer, if imported.

A warning that the cycle should always be placed on a level surface for use, shall be permanently displayed on a label fixed to the cycle in a conspicuous location.

NOTE: Manufacturers making a statement of compliance with this Australian Standard on a product, packaging, or promotional material relating to that product are advised to ensure that such compliance is capable of being verified.

4.2 USER INSTRUCTIONS User instructions shall include the following, which are to be provided in a simply understood form in an owner's manual or card attached to the cycle at the time of sale, or for a partially assembled cycle, within the consumer package:

(a) Instructions for assembly, including correct fitting of guards and other safety devices, and warnings about the likely injuries to young children if exercise cycles are operated in their vicinity without properly fitted guards.

(b) Instructions for maintenance, including regular checking of the integrity of guards and safety devices.

(c) Instructions for the correct adjustment of the seat.

APPENDIX A

POTENTIAL HAZARDS ASSOCIATED WITH EXERCISE CYCLES

(Informative)

Figure A1 illustrates points of hazard which can be present if the flywheel, chain and sprocket system, or the flywheel loading mechanism on an exercise cycle are not adequately guarded.

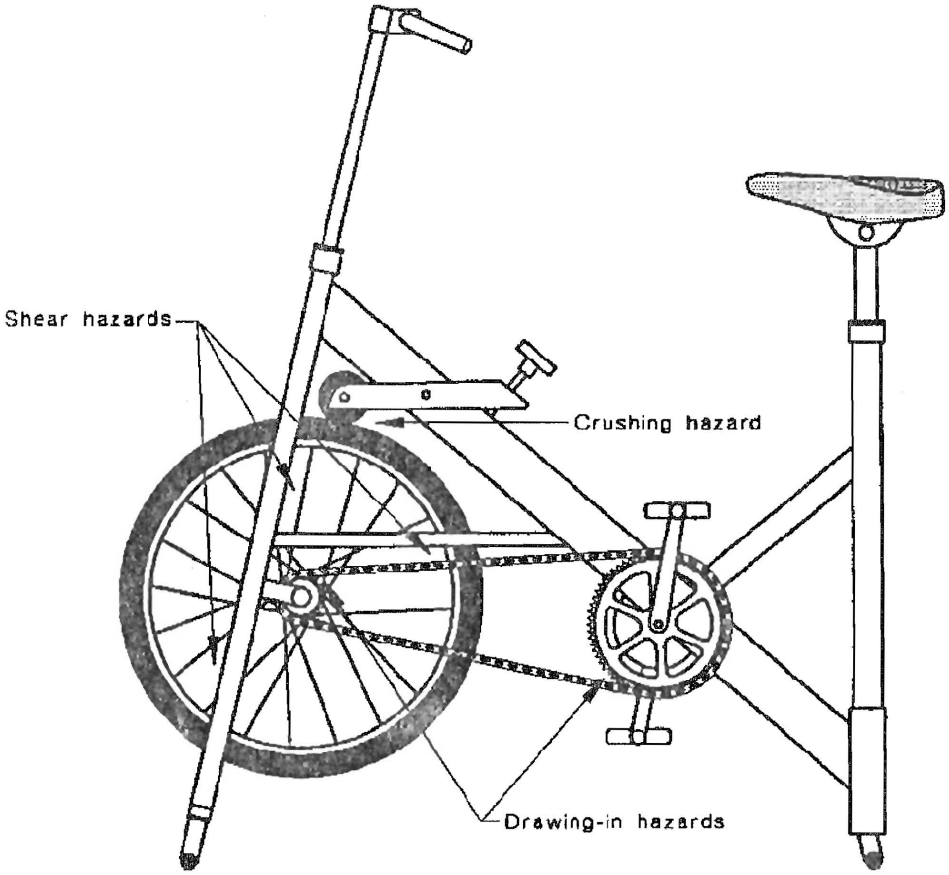


FIGURE A1 EXAMPLE OF AN EXERCISE CYCLE SHOWING POTENTIAL POINTS OF HAZARD IF NOT GUARDED

APPENDIX B

TESTS FOR GUARDS ON EXERCISE CYCLES

(Normative)

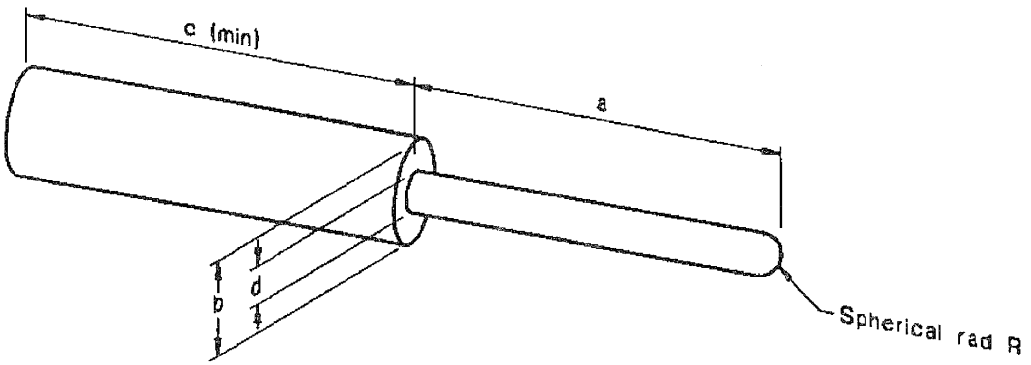
B1 SCOPE This Appendix specifies the tests to be applied to guards on exercise cycles to check their structural adequacy and their ability to prevent a child's fingers reaching hazard points when moving parts are in operation.

B2 PRINCIPLE The tests involve probing the test cycle with test probes to find any location where a child's finger could reach dangerous parts, and to find any locations where a guard will not resist a test force sufficiently to prevent either forced penetration, permanent deflection or fracture of the guard.

The tester is required to actively search out all possible locations on or around a test cycle where the test apparatus could reach dangerous parts or where application of the specified force could cause unacceptable deflection of a guard.

Two separate tests are performed. The first (Test A) uses the thinner of the two specified test probes to test the guarding of the drive train, and the second (Test B) uses the thicker probe to test the guarding of the flywheel and loading mechanism.

B3 APPARATUS The apparatus shall comprise two test probes as specified in Figure B1.



	a	b	c	d	R
Probe A	75	40	100	5.6	2.8
Probe B	75	40	100	9.3	4.65

DIMENSIONS IN MILLIMETRES

FIGURE B1 TEST PROBES

B4 PROCEDURE—TEST A The test procedure for Test A is as follows:

(a) Clamp the test cycle to a bench or stand so that it can be operated by turning the pedals by hand without becoming unstable.

(b) Adjust any loading device so that the flywheel is lightly loaded, but the mechanism can be activated by turning the pedals by hand.

NOTE: Some loading will need to be exerted by the loading device so that the device itself can be checked for unguarded hazards.

(c) Turn the pedal by hand. While so doing, and using Test Probe A, search for and test locations in and around the guard protecting the drive train mechanism, i.e. the chain and sprockets, or gears if the cycle is so equipped—

(i) where the test probe can be inserted or offered up so that it would suffer shear, crushing, or drawing-in likely to cause permanent injury if the probe were a child's finger; and

(ii) where the application of an axial force of 20 ±2 N to the probe will either cause it to penetrate through or around the guard such that the hazards in Item (i) would occur, or cause permanent deformation of the guard (other than a minor dent no larger than the tip of the probe) or fracture of the guard or its supports.

The depth of insertion of the probe, including any forced insertion during application of the 20 ±2 N axial load, shall be as follows:

(A) For any hole, recess, or opening having a minor dimension (the minor dimension of an opening is the diameter of the largest sphere that will pass through the opening) smaller than the collar diameter of the probe, the maximum insertion depth shall be up to the collar of the probe.

(B) For any hole, recess, or opening having a minor dimension larger than the collar diameter of the probe, the maximum insertion depth shall be 2.25 times the minor dimension of the hole, recess, or opening, measured from any point in the plane of the opening.

NOTE: If a precise means of axially loading the test probe in any direction to 20 ±2 N is not available, it is suggested that locations requiring testing be tested by using a probe of 2 kg mass, and with the test cycle removed from the bench or stand and rotated to the required attitude, by applying the axial force to the probe under gravity.

B5 PROCEDURE—TEST B The procedure for Test B is as follows:

(a) Set up the test cycle as specified in Paragraphs B4(a) and (b).

(b) Turn the pedals by hand. While so doing, and using Test Probe B, search for and test locations in and around the guard protecting the flywheel and flywheel loading mechanism—

(i) where the test probe can be inserted or offered up so that it would suffer shear, crushing, or drawing-in likely to cause permanent injury if the probe were a child's finger; and

(ii) where the application of an axial force of 20 ±2 N to the probe will either cause it to penetrate through or around the guard such that the hazards in Item (i) would occur, or cause permanent deformation of the guard (other than a minor dent no larger than the tip of the probe) or fracture of the guard or its supports.

The depth of insertion of the probe, including any forced insertion during application of the 20 ±2 N axial load, shall be the same as that specified for Test A in Paragraph B4(c).

B6 REPORT The following shall be reported:

(a) The make, model and serial number (if any) of the test cycle.

(b) A precise description of all locations in which each of the two specified test probes were able to reach dangerous parts without exceeding the insertion depths specified in Paragraph B4(c), including locations where penetration resulted from application of the specified axial force.

(c) A precise description of all locations where application of the specified axial force through each of the two specified test probes produced unacceptable permanent deformation of a guard, or fracture of a guard or its supports.

(d) Reference to these test methods, i.e. AS 4092, Appendix B, Tests A and B.

APPENDIX C
TEST FOR INTEGRITY OF SEAT AND SEAT SUPPORT
(Normative)

C1 SCOPE This Appendix specifies the test to be applied to the seat of the exercise cycle to check the ability of both the seat and its support to resist failure which could cause impalement or other injury to the user.

C2 PRINCIPLE The test involves application of static loads to the seat and checking for dynamic deflection of the seat and frame under a 100 kg load and permanent deflection after application of a 200 kg load, and also for any signs of failure.

C3 APPARATUS A 100 ±2 kg mass and a 200 ±2 kg mass, each in a shape suitable for placing on the exercise cycle seat so as to be wholly supported by the seat.

C4 PROCEDURE The test procedure is as follows:

(a) Extend height and any other seat adjustments to their maximum recommended travel, i.e. to the point where the structural strength of the system is at its least.

(b) Hold the cycle in a vertical position in such a way that it is free to deflect vertically under the test loadings and measure the vertical height of a point on the seat frame.

(c) Place the 100 kg mass on the seat so that its centre of gravity is vertically above the centre of the seat support and measure the change in vertical height of the point on the seat frame after 1 min with the load still applied.

(d) Replace the 100 kg load with the 200 kg load and leave it in position for 5 min.

(e) Remove the 200 kg load and again measure the change in vertical height of the point on the seat frame.

(f) Examine the seat and its support for signs of slippage or fracture.

C5 REPORT The following is to be reported:

(a) The make, model and serial number (if any) of the test cycle.

(b) The dynamic deflection of the seat and frame under the 100 kg load.

(c) The permanent deflection of the seat and frame after application and removal of the 200 kg load.

(d) Any signs of slippage or fracture in the seat or its support.

(e) Reference to this test method, i.e. AS 4092, Appendix C.